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ABSTRACT

Seventeen sets of opposite sex twins, 13 to 14 months old, were observed in a playroom situation with their mothers. Attachment behaviors, toy preference, style of play, and activity level were recorded. Analysis of four attachment behaviors indicated that girls looked at, vocalized to, and maintained proximity with their mothers significantly more often than did their brothers. Girls also touched their mothers more often, although this difference was not significant. The style of play and activity level measures revealed no sex differences. In terms of specific toy preferences, girls tended to play with the cat and dog more, while boys tended to play more with the pull toy. No other differences in toy preference were found. The effects of social class, activity level, and separation from the mother on at infant attachment behavior are discussed. The importance of the mother as a socializing and sex-typing agent is stressed. (Author)

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Attachment Behavior in Thirteen-Month-Old, Opposite Sex Twins

Jeanne Brooks and Michael Lewis[1]

Educational Testing Service

Whether sex differences are to be found in infant behaviors is a question that has received a great deal of attention. Since the attachment bond between infant and caregiver is a consequence of the infant's first significant social interaction, differences in infant and maternal behaviors, which are a function of the sex of the infant, may provide the foundation for later sex-appropriate socialization patterns. Attachment, or the affectual bond between the infant and its primary caregiver, usually its mother, is typically measured by a variety of behaviors categorized as proximal or distal (Lewis & Ban, 1971). Proximal behaviors, such as touching, rocking, and clinging, involve physical contact. Looking, smiling, and vocalizing, which are distal behaviors, are also important in the formation of attachment bonds (Ainsworth, 1963; Bowlby, 1969; Goldberg & Lewis, 1969; Walters & Parke, 1965). The specific focus of the present study is on infant attachment behaviors (both proximal and distal) exhibited toward the mother by the year-old infant.

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The playroom situation devised by Lewis has yielded the most consistent infant sex differences. Three studies, using the playroom setting, have been reported: (1) Goldberg and Lewis (1969) observed 64 middle class infants, approximately 1 year-old, and their mothers; (2) Messer and Lewis (1972) observed 33 one year-old lower class infants and their mothers; and, (3) Lewis, Weinraub and Ban (1972) observed 20 one year-old, upper middle class infants with both their mothers and fathers. In all three studies, the child was placed in a toy-filled room with one parent for fifteen minutes. Observers behind one-

way mirrors recorded proximal and distal attachment behaviors directed toward the mother, as well as toy preferences. Sex differences were found in all of the studies. Specifically, Goldberg and Lewis found that girls spent more time in proximity to their mothers, touched them more, and returned to them more often than did the boys. In terms of distal behaviors, the girls vocalized to and looked at their mothers more than did the boys. In the lower class sample, Messer and Lewis found sex differences in proximal behaviors such that the girls touched and returned to their mothers significantly more often than did the boys. While no mean sex differences were found in the upper middle class sample of the Lewis, Weinraub and Ban study, sex differences in distal behaviors exhibited toward the parents were observed.

Sex differences in proximity-maintaining behaviors have also been reported by Bronson (1971) and Maccoby and Jacklin (1973). Bronson presented a large moving object which emitted flashing lights and sounds to 15-month-old infants. Equal numbers of girls and boys initially left their mothers to explore the novel object; however, of the infants who hesitated, the girls showed a longer latency to departure from their mothers. Maccoby and Jacklin (1973) have reported that 13- to 14-month-old girls spent 30 percent more time in proximity to the mother than did the boys in an exploratory situation, although the difference was not statistically significant.

Rheingold (Rheingold & Eckerman, 1969, 1970) and Ainsworth (Ainsworth, 1963; Ainsworth & Bell, 1970; Ainsworth, Bell, & Stayton, 1971), using somewhat different procedures, found no sex differences in attachment. Rheingold used two rooms, one which contained toys and one in which the mother sat. The infant was allowed access to both rooms and freedom to move between them. The procedure used by Ainsworth involved a series of eight short episodes (approximately three

minutes in length) with different combinations of mother, infant, and female adult stranger present. Finally, in a naturalistic study of African infants, Ainsworth (1967) also found no sex differences in infant attachment behaviors.

Furthermore, differences in maternal behavior as a function of infant sex have been observed in a number of studies. Goldberg and Lewis (1969) reported that mothers of 6-month-old infants touched and vocalized more to girls than to boys. These same female infants, when seen at approximately one year of age, touched, vocalized, and looked at their mothers more than did the males. Maternal behavioral differences have also been observed in studies of mother-infant dyads. Moss (Moss, 1967; Moss, Pederson & Robson, 1969) reported significant differences in maternal behavior toward three-month-old infants as a function of infant sex. Lewis has also reported similar findings (Lewis 1972; Lewis & Freedle, 1973).

In all studies of sex differences, either in infant behavior toward the mother or her behavior toward the infant, two different samples of infant-mother dyads were tested; one consisted of boy infants and their mothers, the other of girl infants and their mothers. Underlying this methodology is the assumption that these sex differences would also be evident when the same mother socializes a male and a female. In the present study we were interested in whether two children, a male and a female, show differential degrees of attachment behavior toward the same mother. One way to do this is to observe a mother twice, once with a male and once with a female infant. This is difficult for several reasons: (1) it would require a longitudinal design; (2) age of infant would be hard to control; and, (3) the effect of birth order on mother-infant interaction would be uncertain. A better method involves the study of opposite sex twins. By raising a male and a female infant concurrently, maternal variables which may change over time are held constant and birth order effects are not involved. A single mother is socializing a male

and a female infant at the same time. Will the mother respond to her male and female children differently and will the twins exhibit different behaviors to their mother? The following study was designed to explore part of this problem. Based upon data gathered from other studies, it was hypothesized that differences in proximal and distal attachment behaviors of one-year-old twins directed to their mothers would be found with girls exhibiting more of both types of attachment behavior than their brothers.

Method

Subjects. Seventeen sets of boy-girl twins, ranging from 11.8 to 15.0 months of age (mean = 13.4 months), were seen. Fourteen pairs were white; three were black. The twins were obtained through hospital birth records and through local twin clubs. All but two of the mothers contacted agreed to participate. The sample was relatively heterogeneous with regard to social class. The mothers had an average of 13.3 years of schooling (range 11 to 16 years); the fathers had an average of 13.8 years of schooling (range 11 to 20 years). The fathers' occupations ranged from a medical doctor to a truck driver.

Play area. The playroom was a carpeted room approximately 9 x 12 feet which was divided into 12 squares (a 4 x 3 grid) by thin lines on the floor. A chair for the mother was placed in one corner. Toys were placed in each of the squares except the three in the immediate vicinity of the mother. The toys included a set of blocks, a pail, a cornpopper, a rubber dog, a stuffed cat, a set of quoits (stacked rings), a wooden mallet, a pegboard, and a wooden pull toy. Two one-way mirrors were used for observation.

Procedure. Each infant, accompanied by its mother, entered the room. The mother sat on the chair and held the infant on her lap. On signal, the child

was placed on the floor by the mother and was free to move about the room. The mother was instructed to watch the child's play and to respond as naturally as possible. Although she was told not to initiate any interaction, she could respond to a behavior initiated by the child. For example, the mother could talk to her infant if the infant vocalized to her and could examine a toy which was brought to her by the infant. Fifteen minutes of play were observed.

Both twins were tested on the same day. The mother took one infant at a time into the playroom while a female cared for the second twin in a waiting room. After the first twin had been observed, the mother spent approximately 15 minutes with both infants in order to minimize the second twin's reaction to the previous separation. Then the second twin was observed in the playroom with the mother. At the end of the second session, both twins were placed in the playroom with their mother for 5 minutes. The order of playroom session was counterbalanced by sex. Approximately half of the girls and half of the boys were observed in the playroom first.

Measurement. Two observers recorded attachment behaviors, toy play, and movement. One operated an event recorder which recorded four of the child's behaviors: (1) touching the mother, (2) looking at the mother, (3) vocalizations directed toward the mother, (crying, whimpering and whining were not scored) and (4) proximity to the mother. Proximity was scored when the infant was in one of the four squares surrounding the mother's chair. Interobserver reliability for the four measures ranged from .89 to .97. A second observer recorded toy play and movement. Movement was defined as the number of squares which the infant crossed during the session. Toy play measures included number of toy changes, time spent playing with any one toy, number of seconds of sustained play (if longer than 15 seconds) and number of toys manipulated in sustained play.

Results

The following analysis considers the differences between the twins in terms of the four attachment behaviors, toy play, toy preference, and activity level.

Insert Table 1 about here

Attachment behavior. Each twin was given a score for the cumulative number of seconds spent touching, looking at, vocalizing to, and maintaining proximity with the mother. Both parametric and non-parametric tests were performed to assess sex differences and both yielded similar results. Matched pair tests (Wilcoxan sign and correlated t tests) were comparable to the independent tests (t tests) and indicate there are sex differences between male and female infants within the same family. Results from the parametric two-way analysis of variance are presented in detail.

The boy and girl twins showed striking differences in attachment behaviors exhibited to the mother. In terms of the mean data presented in Table 1, the girl twins touched ($F = 1.69$, NS), looked at ($F = 12.76$, df 1,31, $p < .001$), vocalized to ($F = 3.00$, df 1,31, $p < .09$), and maintained proximity ($F = 5.78$, df 1,31, $p < .02$) longer than did the boy twins.

The order of playroom session (first versus second) was also analyzed for effect on attachment behaviors. No significant order effect was found.

Insert Table 2 about here

Toy play, toy preference, and activity level. While Goldberg and Lewis (1969) and Messer and Lewis (1972) found sex differences in attachment behavior, they found no differences in number of toy changes, amount of sustained play or activity level. In the present study the data bearing on these dimensions for the twins are presented in Table 2; once again there are no sex differences. It is especially important to note that there are no sex differences in activity

level. Therefore, one cannot argue that differences in maintenance of proximity are a function of activity level; instead they probably reflect the child's attachment relationship with its mother.

Total amount of time spent with each toy was also analyzed for sex differences. All but two of the nine toys were played with equally by both boys and girls. Girls tended to play with the cat and dog more than boys ($t = 1.87$, $p < .10$), and boys tended to play with the wooden pull toy more than girls ($t = 1.69$, $p < .10$).

The amount of time spent playing with toys requiring fine motor coordination (quoits, pegboard, and blocks) and those involving gross motor activity such as banging, pulling, and running (pull toy, cornpopper, and mallet) was also analyzed. Boys tended to spend more time with the gross motor activity toys than did the girls ($t = 1.76$, $p < .10$). There were no sex differences in amount of fine motor play.

Discussion

Observation of the twins' attachment behaviors indicate that the girl twins vocalized to, looked at, and sought proximity with their mothers significantly more than did their brothers. These differences are consistent with other findings using these laboratory procedures. We have suggested that these differences are due to the sex-appropriate teaching of the mothers. If the mother reinforces specific sex-stereotyped action, the infant will learn the appropriate (desired) behaviors. Furthermore, Lewis (1972) has suggested that maternal socialization minimizes the proximal behaviors exhibited by mother and son while not restricting such mother-daughter interaction. Therefore, the boy twins are less likely to remain near the mother. The mother may not only discourage proximal forms of attachment, but may restrict all forms of attachment as she encourages independent behavior in male infants.

Even though we have demonstrated that sex differences exist when the mother is raising a male and a female concurrently, we have not collected information on specific maternal socialization techniques. However, anecdotal evidence indicates that mothers are sex-typing their twins at this early age. As Goldberg and Lewis observed, mothers tend to become irritated when experimenters incorrectly identify the sex of their infant. With boy-girl twins, the likelihood of mislabeling is even greater. If infant twins are dressed alike, it is especially difficult to identify the sex of each infant. To minimize incorrect labeling, the mothers may dress their infants in sex-appropriate clothing. To "test" this hypothesis, the color and type of clothing worn by each twin was noted. Of the 17 sets of twins observed, only one pair was dressed in identical outfits. Nine sets of twins were wearing overalls, but correct sex could be identified by the color of the clothing: the girls wore pink, red, or yellow; the boys wore blue, green, or brown. The other seven mothers had dressed their boys in pants, their girls in dresses. It is interesting to note that in observations of same sex twins, differential dressing does not occur as frequently.

We also asked the mothers about the twins' toy preferences at home. Even though a mother's report may be inaccurate, her perception of sex differences may indicate how she is responding to each infant. Nine mothers stated that their twins played with the same toys, while the other eight reported differences. According to seven mothers, their boy twins preferred to play with toys that made noise, such as trucks and push toys, while their girl twins enjoyed stuffed animals, small hand toys and books. These reported differences were partially substantiated in the playroom, since girls tended to spend more time with the cat and dog and boys more time with the pull toy. However, we found no other toy preferences or manner of play differences. This is perhaps due to the fact that toys appropriate for both sexes are found in these twins' homes. Mothers of opposite sex twins might purchase both trucks and dolls with which both

children would play. On the other hand, mothers of singletons may purchase sex-appropriate toys for their infants; therefore, trucks might be available for boys but not for girls. Consequently, the sex differences in toy preferences reported by Goldberg and Lewis (1969) might reflect differences in the home toy materials, while the lack of such preferences in this study may be due to the presence of both "male" and "female" toys in the twins' homes.

We found no activity level differences between the boy and girl twins. Rheingold and Eckerman (1969) and Goldberg and Lewis (1969) also find no sex differences in activity level. In a working class sample Messer and Lewis (1972) found that girl infants tended to be more active in terms of number of squares traversed than did boys; mobility, however, was not related to proximal attachment. It seems that boys do not exhibit more activity than do girls. Therefore, the girls' tendency to seek proximity to their mothers cannot be attributed to a low activity level. That is, girls do not spend more time near their mothers than do boys because they move about the room less. Reviews of sex difference (e.g., Bardwick, 1971) often state that there are innate activity differences, despite the fact that there is little evidence to substantiate this hypothesis (Maccoby and Jacklin, 1971). For example, Bell (1971) has found no activity level differences in neonates when birth trauma is controlled and, in a longitudinal study, reports that two-and-a-half-year-old boys and girls do not differ in restless movement or high vigor behavior. In addition, activity level does not seem to be a stable characteristic, as it has been found to vary across repeated measurements (Maccoby and Jacklin, 1973).

Since the twins were seen on the same day, half of them were separated from their mothers before entering the playroom. Coates (1970) and Ainsworth and Bell (1970) have found that separation from the mother, both with and without another adult present, elicits protest behavior, and reunion with the mother

often results in increased proximity-seeking. In these studies, the infant's immediate response to reunion was observed. However, we found that separation does not result in greater attachment behavior if the infant is allowed to interact with the mother for fifteen minutes beforehand. In short, brief separations do not seem to have long-lasting effects in year-old infants.

Sex differences in attachment behavior have now been demonstrated in three studies using a free play situation--the present study, Goldberg and Lewis (1969) and Messer and Lewis (1972). Moreover, across other situations designed to measure attachment behavior there have been varying results (Ainsworth & Bell, 1970; Maccoby & Jacklin, 1971; Rheingold & Eckerman, 1969). What dimension might account for the conflicting results on sex differences in attachment behaviors? In the following discussion we will suggest four possible dimensions: time in the situation, size of the room in which the study took place, ecology of room, and social class.

Time. In most of the studies conducted in our laboratory, the mother and infant are observed for 15 minutes. In many other studies 3 to 10 minutes of observation have been taken. Analysis of the situation reveals that time in the room may affect attachment scores.

We have recently analyzed the effects of time on attachment behavior exhibited to the mother (Brooks & Lewis, 1973). The data suggest that both proximal attachment behaviors increase as a function of time spent in the playroom. Distal behaviors tend to remain more stable over time. Perhaps the increase in proximal attachment is related to familiarization of a strange setting, or to boredom. In any case, observation of short periods of time may not result in a very stable measure of attachment.

Size of room. Many aspects of the room may be critical. While it has not yet been explored, it seems quite reasonable to assume that different sized and

shaped rooms can result in different attachment behaviors and in the elimination or enhancement of individual and group differences. If size and shape of tables either retards or facilitates communication (Altman & Haythorn, 1967; Base & Klubeck, 1952), might the same be true for room size and shape? For example, a small room may cut down on the need for proximal behavior and thus enhance distal behavior. In addition, it may be that size of the room plays an important role in the interrelationship between the proximal and distal measures. It would appear that large rooms may facilitate the distinctive feature of proximal and distal contact (result in stronger negative correlations) while smaller rooms may blur the distinction.

Toys in the room. This issue refers to the objects in the room or what we shall call the room's ecology. Imagine a room which is carpeted, full of toys, and has pictures on the walls as compared to an empty room which has few or no toys and nothing on the walls. Such differences obviously might affect the results of an attachment study. Under the latter condition, the infant's cognitive concern or even fear of the room's strangeness (i.e., compared to what they are used to) might seriously alter the attachment behavior. One might postulate that under any strange or unusual condition, the child's affiliative rather than attachment behavior is elicited by his anxiety (see Schachter, 1959, for a discussion of the relationship between anxiety and affiliation). Attachment and affiliative-like behaviors may appear the same, especially for proximity behaviors. A requirement of true attachment behavior is that it is unique between parent and child and would not be elicited between "others" and child. Proximity seeking in a threatening environment may occur with any adult figure, not just the infant's mother. Therefore, it is not sufficient to just observe behavior independent of the context in which it occurs. Proximity is not always a measure of attachment, especially when there is a threatening or stressful situation.

Social class. The final dimension which might affect the results of a study on attachment is family social class background (itself a carrier of the parental attitudes toward the display of attachment behavior). In most studies the background of the subjects has not been mentioned. Coates (Coates, 1970; Coates, Anderson & Hartup, 1972) recently indicated that his sample was for the most part upper middle class, professional, and we suspect that this may be true of many of the studies conducted in university communities. Thus, another possible reason for the failure to observe consistent sex differences is that different social class levels are involved.

In general, sex differences in attachment behaviors and in toy preferences are only found in samples of infants which are raised in middle or working class families. Coates (Coates, 1970; Coates et al., 1972) and Lewis et al. (1972), who observed infants from upper middle class homes, found no sex differences in attachment. In professional families, there may be less sex differentiation in infants' attachment, exploration, and toy play behaviors. The upper middle class mother may encourage independence and exploration in both males and females, since her cultural expectations for her children may be different than those for nonprofessionals. To examine the relationship of attachment and social class, the four Lewis studies, which were identical in procedure, were compared (Lewis, Weinraub & Ban, upper middle class; Goldberg & Lewis and Brooks & Lewis, middle class; Messer & Lewis, working class). The upper middle class infants tended to touch their mothers more and, at the same time, played with the same number of toys as did the middle and working class infants. Perhaps the former infants were using their mothers as a secure base for exploration, a concept developed by Ainsworth (1963). The upper middle class infants may have left the mother to play with the toys, but returned to her frequently. Also, the infants may have brought

the toys back to the mother and played with her, which would result in high touching scores. In contrast, the middle and working class infants seem to have left the mother, played with the toys alone, and not returned to the mother with the toys. Unfortunately, comparable data on the number of times each infant returned to the mother are not available.

In order to explain the conflicting results on sex differences in attachment, the effects of dimension such as time, room size, and social class must be analyzed. A critical look at such dimensions may also help to clarify the meaning of those behaviors which have been labeled attachment.

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Footnote

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Table 1

Mean Number of Seconds for Attachment Behaviors by Sex

	Touch	S.D.	Prox.	S.D.	Look	S.D.	Voc.	S.D.
Male	56.64	81.4	419.89	188.2	45.61	36.2	40.20	20.4
Female	104.60	124.2	590.04	218.6	82.97	78.0	70.88	29.5
Difference	47.96		170.15		37.36		30.68	

Table 2

Toy Play and Activity Level

Behavior	Male	Female	p
Total number of toy changes	19.8	15.7	NS
Number of the 9 toys played with	5.8	4.8	NS
Total number of seconds in sustained play	555.0	517.5	NS
Longest time spent with one toy	176.8	198.9	NS
Number of toys played with in sustained play	8.6	7.1	NS
Movement--number of squares traversed	49.9	45.1	NS